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A left–right comparison of UVB phototherapy and topical photochemotherapy in bilateral chronic hand dermatitis after 6 weeks' treatment

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Summary

We have compared the efficacy of local UVB phototherapy with topical (bath) photochemotherapy in 13 patients with bilateral chronic hand dermatitis. In each patient, one hand was treated with UVB phototherapy and the other hand with topical (bath) photochemotherapy. Both treatments moderately improved the chronic hand dermatitis after 6 weeks' treatment. We observed no significant differences in improvement between the modalities, but side-effects occurred more often on the photochemotherapy-treated side. Considering the similar responses and relative incidence of side-effects, we would advise starting treatment with UVB phototherapy and only using topical photochemotherapy if this fails.

Several studies have shown the therapeutic effectiveness of oral psoralen photochemotherapy (PUVA) in treating hand dermatitis, defined as a chronic inflammatory eruption of the hands with vesicles or hyperkeratotic lesions without evidence of psoriasis.^{1–4} The efficacy of UVB phototherapy has also been demonstrated in 10 patients with allergic contact dermatitis of the hands;⁵ treatment times, however, were lengthy (the mean being 5 months) and maintenance therapy was necessary. In a further study, oral PUVA was compared with UVB phototherapy in 35 patients with chronic eczematous dermatitis of the hands of varying aetiology,⁶ both treatments being effective, although the results with PUVA were better. Finally, topical PUVA for chronic hand and foot dermatoses has also been shown to be effective,⁷ while topical (bath) PUVA in psoriasis was as useful as oral PUVA;^{8,9} in addition, an advantage of the topical over oral PUVA was the lack of systemic, particularly gastrointestinal, side-effects.

Phototherapy increases the incidence of phototoxic reactions¹⁰ and non-melanoma skin cancer, but the risk

of the latter is smaller for UVB phototherapy than for PUVA.¹¹ Topical PUVA also carries this risk but it is not known whether this differs from that of oral PUVA; it has, however, been suggested that topical treatment may be safer.^{12,13} Nevertheless, in view of the probable greater safety of UVB phototherapy, we have carried out a left–right comparison of its therapeutic efficacy as compared with that of topical bath PUVA in chronic hand dermatitis.

Patients

Thirteen patients with bilateral chronic hand dermatitis entered the study after informed consent was obtained, the disorder being defined as an eruption with vesicles or hyperkeratotic plaques of the hands present for longer than 6 months. Patients with severe vesiculation or bullae or with evidence of psoriasis were excluded. Photo-dermatoses, light-aggravated dermatoses, and a history of melanoma, immunosuppressive therapy, severe impairment of renal or liver function or pregnancy were reasons for exclusion.

In all patients, cutaneous patch testing was first undertaken with the European standard series following International Contact Dermatitis Research Group (ICDRG) guidelines; intracutaneous skin tests were also performed with a standard tray (Bencard, Artu Biologicals, Lelystad, The Netherlands).

Methods

Each patient was treated with local UVB phototherapy on one hand and topical (bath) PUVA on the other, alternate patients being selected for UVB phototherapy for the right hand and topical PUVA for the left and vice versa. UVB phototherapy was carried out three times a week and topical PUVA treatment twice. All patients were treated for 6 weeks with the exception of one patient who cleared after 3 weeks. At the end of the 6 weeks, we continued the therapy with both modalities if a comparable clinically significant improvement was obtained,

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	UVB-treated side	Bath PUVA-treated side
Mean total score \pm s.e.m.		
Before treatment	8.98 \pm 2.17	10.17 \pm 2.26
After treatment	5.51 \pm 2.14	7.66 \pm 2.58
Mean number of treatments (range)	17 (6–19)	11 (4–13)
Mean maximum ultraviolet dose (range), J/cm ²	0.8 (0.1–1.0)	1.3 (0.3–2.0)
Mean total ultraviolet dose (range), J/cm ²	5.7 (0.5–7.2)	7.1 (1.0–10.7)

Table 1. Improvement of bilateral hand dermatitis after 6 weeks of treatment with topical UVB to one hand and topical bath PUVA to the other ($n = 13$)

stopped it completely if no improvement had occurred, and treated both with the more effective of either UVB phototherapy or topical PUVA if a clinically greater improvement had occurred with one of the modalities. From 1 week before the start until the end of the study the participants were not allowed to use any medication other than bland emollients for the hands, and all were instructed to avoid contact with water and irritants and to avoid relevant allergens where possible.

Clinical evaluation

At the start of treatment and at 2-weekly intervals, the hands were evaluated by means of a clinical assessment score, based on a severity index corrected for the size of the affected skin area. For this, we divided each hand into seven areas, the palm, the back of the hand and the five fingers, each area having its own correction factor based on the relative size of this skin area, estimated for the palm and back of the hand as 0.25 and for the fingers 0.1; the percentage of the area affected was then indicated on

a scale of 0–4 (0 = 0%, 1 = 1–25%, 2 = 26–50%, 3 = 51–75%, 4 = 76–100%). For each area we then scored the intensity of erythema and oedema, vesicles and papules, and dryness, scaling and hyperkeratosis, on a 0–3 scale (0 = none, 1 = slight, 2 = moderate, 3 = severe). Finally, for each area we multiplied together the percentage of the affected area, the correction factor and the sum of the intensities of the symptoms, after which the total score was the sum of the scores of the seven areas. We also independently evaluated the subjective complaints of itching and pain on a 0–3 scale.

Before the start of the study we assessed the minimal erythema dose (MED) and the minimal phototoxic dose (MPD) on the ventral side of the forearm in 10 healthy volunteers; the mean MED was 54 s (0.18 J/cm²) and 80 s (0.62 J/cm²), respectively. We then started treatment with 40% of the mean MED or MPD. The incremental dose at each treatment was 20% for topical PUVA, while for UVB we started with 20% increments for the first five treatments and then slowly tapered the incremental dose; if slight erythema occurred, however, the dose was not increased, while if there was moderate erythema the dose was decreased by 30%, and if severe erythema, no treatment was given for one session and the dose decreased by 50% at the next.

Table 2. Individual improvement of bilateral hand dermatitis after 6 weeks' treatment.

Patient	UVB-treated side (% improvement)	Bath PUVA-treated side (% improvement)
1	100	100
2	14	–11
3	–100	0
4	21	–7
5	3	3
6	11	39
7	53	66
8	1	39
9	76	66
10	55	–26
11	80	45
12	64	70
13	56	53

UVB treatment

The UVB light source consisted of a Waldmann UV 200 unit (14 F8T5 UVB tubes) above a Waldmann UV 180 unit (eight F15T8 UVB tubes), the emission spectrum being 285–350 nm with peaks at 310 and 315 nm, and the intensity 2.9–3.6 mW/cm².

PUVA treatment

Patients were asked to immerse the hand to be treated in a solution of the psoralen, trioxsalen, for 15 min, 8 ml of trioxsalen at a concentration of 0.1 mg/ml being diluted in 4 l of water. Immediately afterwards, exposure to UVA took place in a Waldmann PUVA 200 unit (14 Sylvania

F8T5 PUVA tubes) above a Waldmann PUVA 180 unit (five F15T8 PUVA tubes and three TL-09 Philips tubes), the emission spectrum being 315–400 nm and intensity 7.2–8.2 mW/cm².

With both methods, the hands were put into the light unit with the palmar surface downwards resting on the glass plate of the 200 unit.

Statistical methods

Both PUVA and UVB efficacies were evaluated by means of the one-tailed Student's *t*-test for paired samples to compare the clinical scores before treatment and at 6 weeks. To compare the relative UVB and PUVA treatment efficacies, we used the two-tailed *t*-test for paired samples.

Results

There were seven male and six female patients with hand dermatitis of the palms and the fingers with mean age 47 years 5 months. The mean duration of the dermatitis was 5 years 8 months; in all patients it was of the chronic type not responding to topical treatment or avoidance of allergic or irritant contact factors. In 12 patients, vesicles were observed during the course of the disease. Five patients showed positive cutaneous patch tests, there being positive reactions to chromate and cobalt in one and just chromate in another; a further one showed positive reactions to monothiolglycollate and thioglycollic acid, one reacted to primin, and one demonstrated multiple positive reactions to thiuram, formaldehyde, quarternium 15, iodine tincture, benzoyl peroxide and diazolidinylurea. Nine of the patients had a history of atopic disease and 10 showed one or more positive intracutaneous skin tests. At the time of inclusion in the study, however, none of these positive tests were apparently relevant to the eczema, although in nine patients, irritant factors probably played a significant part. Three patients were of skin type II, seven skin type III and three skin type IV as defined by Fitzpatrick.¹³

Twelve patients were treated with UVB and PUVA for at least 6 weeks. One cleared completely after 3 weeks of phototherapy and was still clear after 6 weeks; in this case, we used the clinical score at 3 weeks as the score for 6 weeks. Four patients discontinued therapy because of a lack of significant improvement after 6 weeks, and we chose to continue PUVA for both hands in three other cases and UVB in two; in three, however, there was no significant difference between the therapies and in these we continued UVB for one hand and PUVA for the other.

Comparison of the UVB and PUVA treatment efficacies

The results after 6 weeks' treatment are listed in Table 1, the mean total score before being 8.98 on

the UVB-treated side and 10.17 on the PUVA side, while afterwards it was 5.51 on the UVB side and 7.66 on the PUVA side; this corresponds to a 39% reduction in total score for the UVB side ($P < 0.05$) and 25% for the PUVA side ($P < 0.05$). This difference in reductions was not statistically significant ($P > 0.05$).

Individually, the reductions in score varied from –100% to 100% for UVB and from –26% to 100% for PUVA, the minus sign denoting deterioration (see Table 2) while the mean number of treatments for UVB was 17 and for PUVA 11, the mean total dose of UVB being 5.7 J/cm² and of UVA 7.1 J/cm².

Itching and pain

All 13 patients suffered from different degrees of itching on both hands; after 6 weeks, however, six were free of the discomfort on both sides and three remarkably better on the UVB side, while in four there was no change. We noted no marked change in pain, however, nine patients initially complaining of this in both hands and eight still complaining of it after 6 weeks.

At the end of the 6 weeks, treatment was continued in nine of the patients. Three received PUVA to both hands, with improvement but not total clearance in two, though this was slow on the side previously treated with UVB, while in two others UVB was continued to both hands for 6 and 11 further weeks, respectively; slight to moderate improvement was achieved on the side initially treated with PUVA, while in one patient the hand that had received UVB from the beginning became almost totally clear by 12 weeks. Three patients were treated with PUVA on one side and UVB on the other for 8–14 weeks; two showed improvement in both hands, slightly more on the PUVA side, while in the other, both hands were almost clear after 12 weeks.

Side-effects

During the 6-week observation period, two patients developed UV radiation-induced erythema of the UVB-treated side on a total of three occasions, while six suffered phototoxic reactions from PUVA on a total of nine occasions; skin type did not seem relevant to the development of these effects. In addition, the PUVA-treated side became far more pigmented than the UVB.

Discussion

We cannot conclude that either UVB or topical bath PUVA treatment of chronic hand dermatitis has higher efficacy than the other, the higher mean percentage of reduction in the total severity scores after local UVB (39%) compared with topical bath PUVA (25%) after 6 weeks of treatment not being statistically significant.

Thus the improvement in hand dermatitis following phototherapy in this study both in terms of reductions in clinical scores and in patient satisfaction was limited, in contrast to the findings in other studies.^{5,6} Patient selection and an abrupt cessation of topical corticosteroid and tar therapy may be one explanation, while another may be differences in the UVB and PUVA dosage regimens.

Topical bath PUVA led to burning reactions more often than UVB, these often tending to occur unexpectedly, necessitating large reductions in dose; interestingly no relationship with skin type was found. This high incidence of phototoxic reactions with topical PUVA has also been observed by other investigators,⁹ and we advise great care with dose increments in patients treated this way. Further, taking into account this high incidence of phototoxic reactions and the possible higher risk of premalignant and malignant skin lesions following topical bath PUVA therapy, we consider it advisable to start with local UVB treatment for chronic eczematous dermatitis of the hands, particularly as such therapy is also less time consuming, no bath being required and sun-protection of the hands not being needed after the treatment sessions. If there is no therapeutic effect with the UVB, however, topical bath PUVA might then be considered. Further work is necessary to define more precisely the benefits of phototherapy as a supplement to topical treatment in this distressing condition.

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